

Radiofrequency Ablation: Facet Joint Pain

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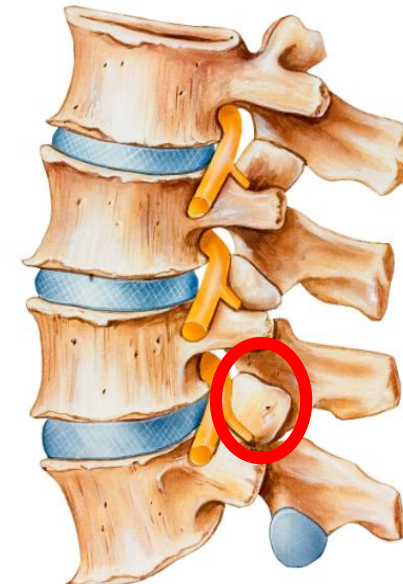
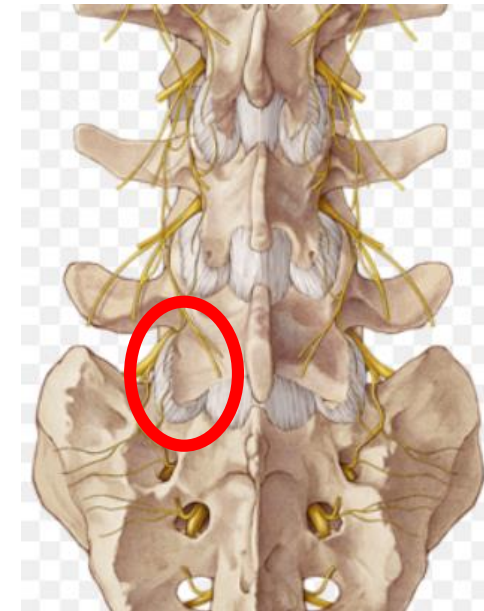
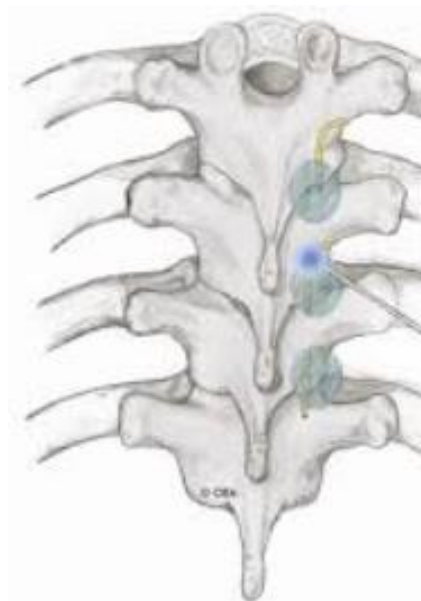
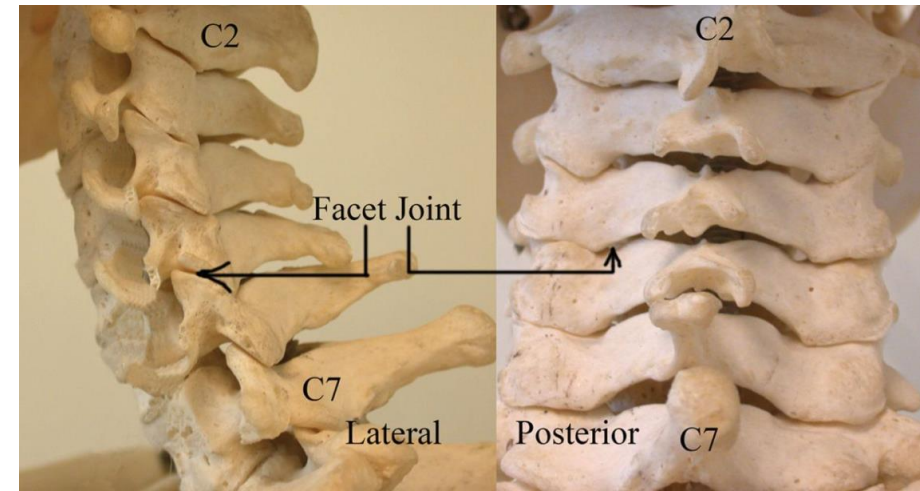
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Procedure room at the Bone and Joint Institute of Tennessee Franklin, TN

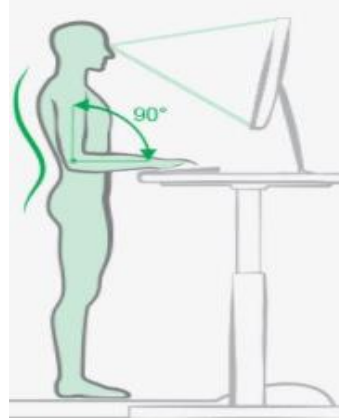
Typical Patient

- >55yo Chronic AXIAL pain
- Osteoarthritis temporality
 - Stiff/Worse in AM, Better with movement, worse after prolonged standing/walking
- Worse with extension>flexion, sidebending, rotation
- Often relieved by recumbence
- Lumbar
 - “Rising from seated position”, Transition flexion/extension
 - “Sitting feels better”
- Cervical
 - “Driving in car/rotation” (cervical specific)



Conservative Treatment (6 weeks)

- Activity Modification
 - Posture (Sagittal balance)
- Medications
- Focused PT (Early Referral)
 - Williams program
- Modalities
 - Traction, Dry needling etc



Medications (temporary due to side effects)

- Anti-inflammatories (Dose is important)
 - OTC Ibuprofen, Naproxen
 - Rx Diclofenac
 - Celebrex or Topical Diclofenac(GI Irritation)
 - Naproxen (Cardiac Risk)

- Pain
 - Tylenol
 - Tramadol → Hydrocodone
 - Prevent ED visit
 - <1 week supply to bridge to referral/procedure only

Physical therapy

- Williams (FLEXION based) PT

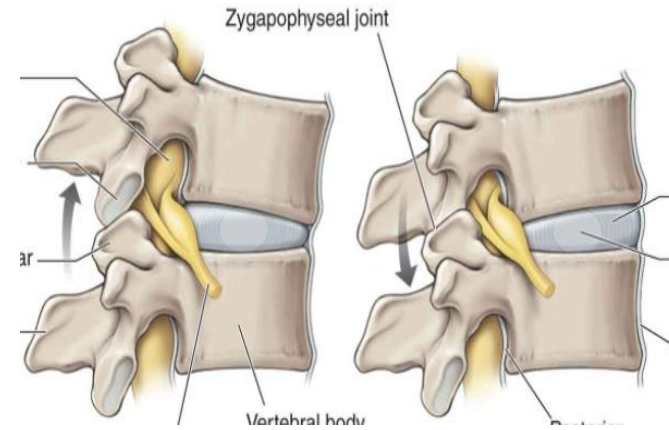
- Facet OA/Synovitis
 - Also spinal stenosis

- GOAL

- Unload facet joint
- Open the central Canal and IV foramen

- STRENGTHEN Abs, Glutes, Quads

- STRETCH hamstrings, erector spinae, TFL



Seated Trunk Flexion



Lumbar Flex Kneeling



Single Knee to Chest



Modified Double Knee to Chest



Posterior Pelvic Tilt



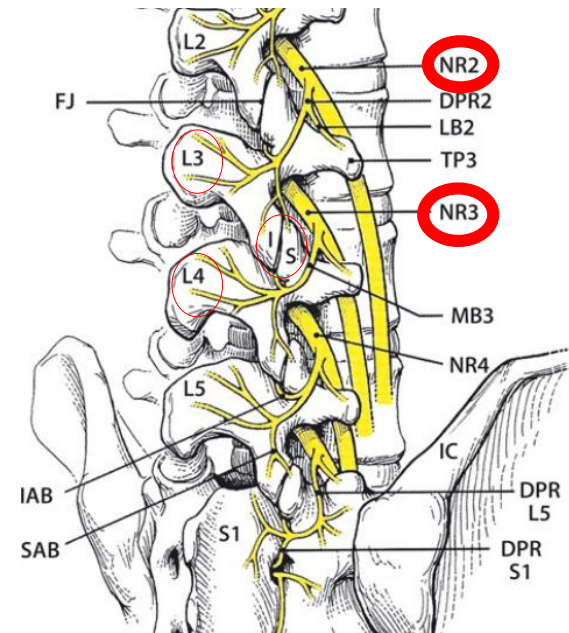
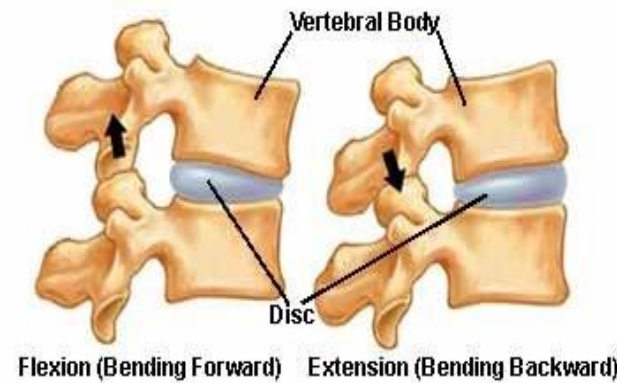
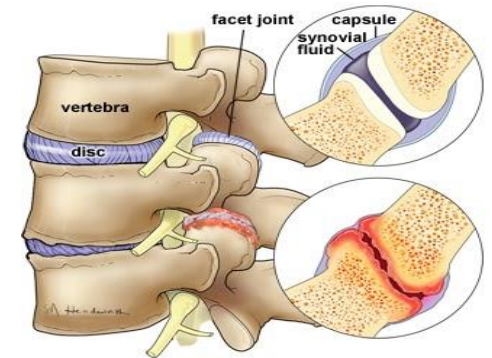
Abdominal Lumbar Training Supine Bent Knee Raises



Partial Sit-Up

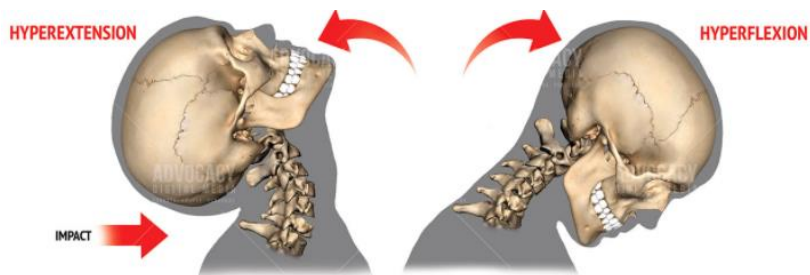
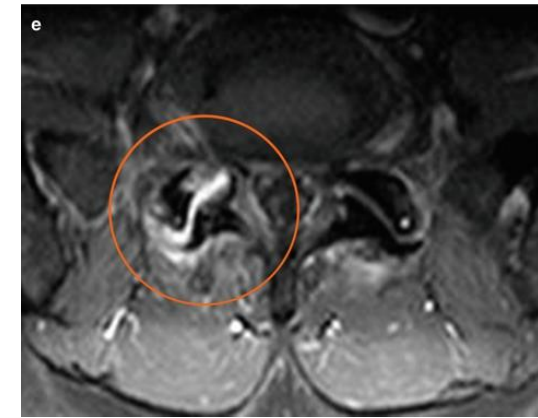
Facet Joint

- Diarthroidal joint with synovial fluid, articular cartilage, and fibrous capsule
- Innervation: Two medial branch nerves
- Location: Posterior spinal column
- Load bearing in extension
- Prevent excessive flexion, extension, and rotation



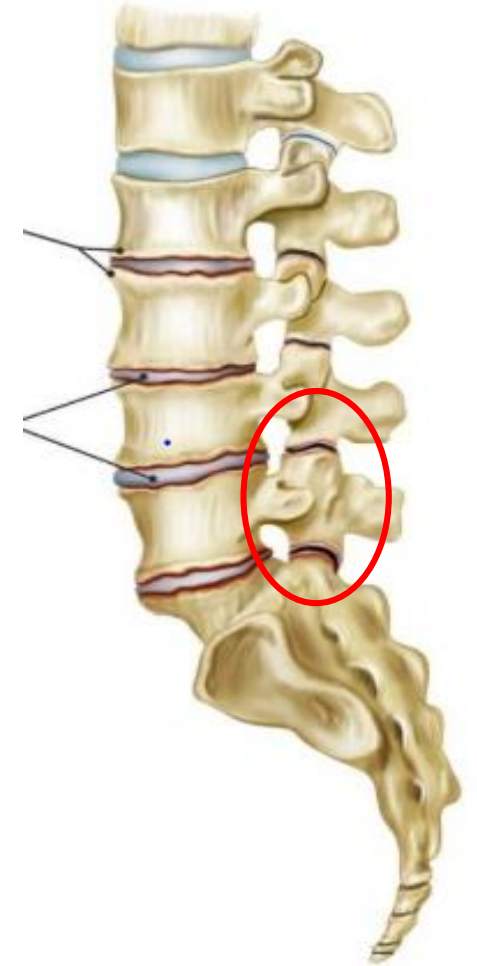
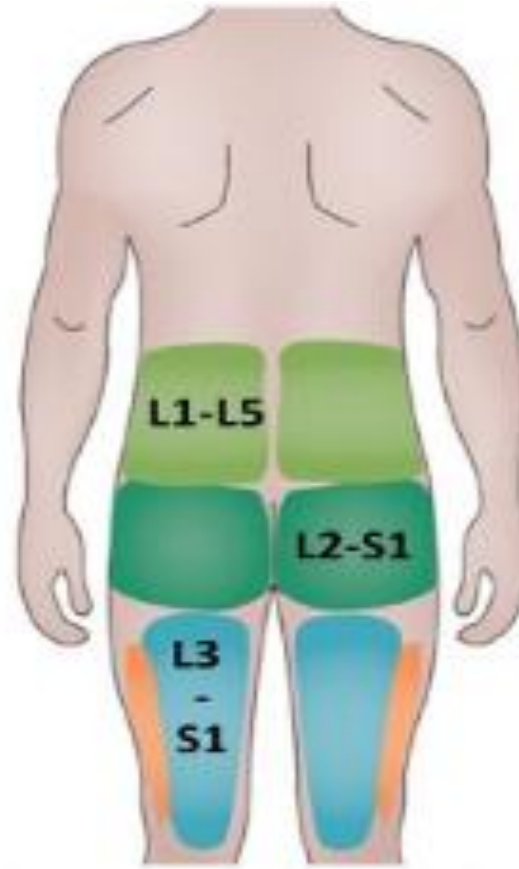
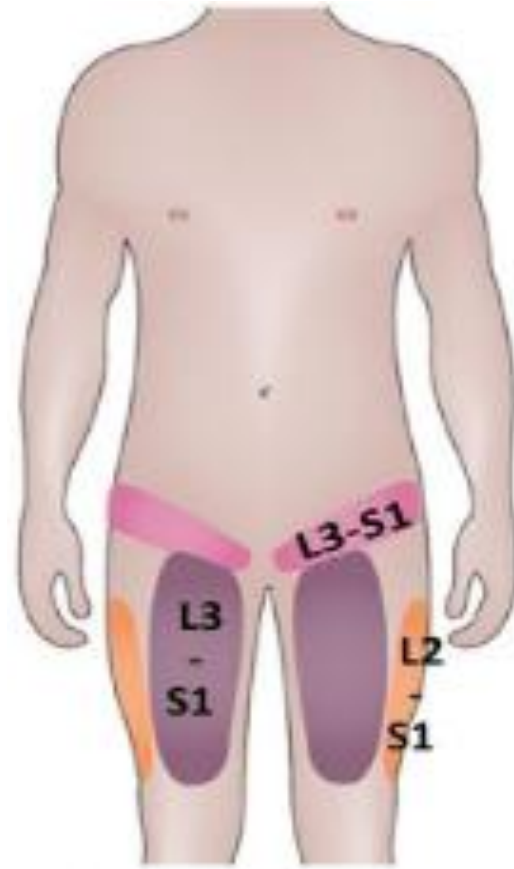
Facet Joint Pain

- Multifactorial process
 - Mainly OA & Disc Degeneration → Increased facet mobility, instability, load bearing → inflammation periosteal contact → medial branches → “facet pain”
- Less common traumatic (whiplash)
 - MC pain source post-whiplash (57%)



Lumbar facet joint pain level prevalence

- MC: L4-5 & L5-S1



Thoracic facet joint pain level prevalence

- MC:? Rare
 - Personally T4-8
- Implicated in 35-45% axial mid-back pain

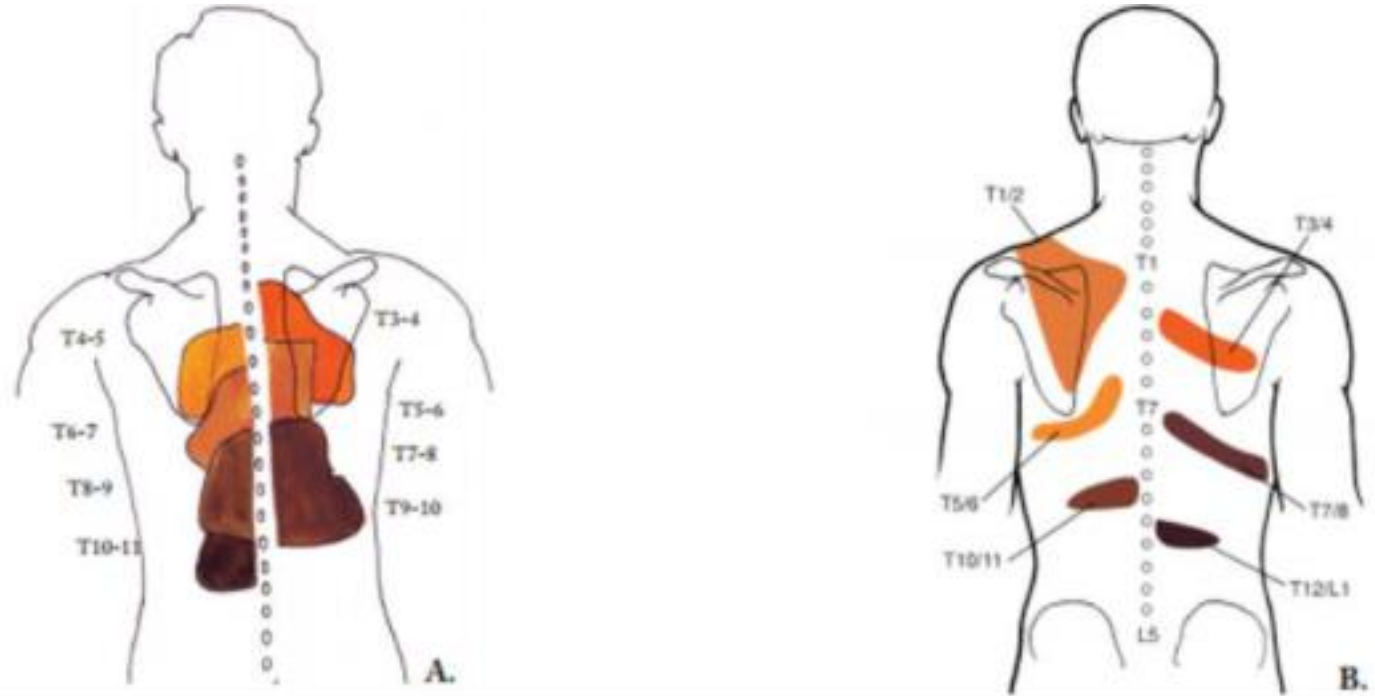


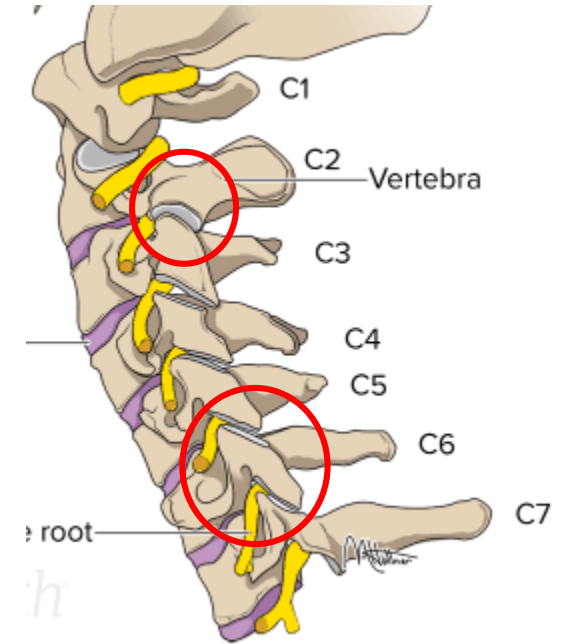
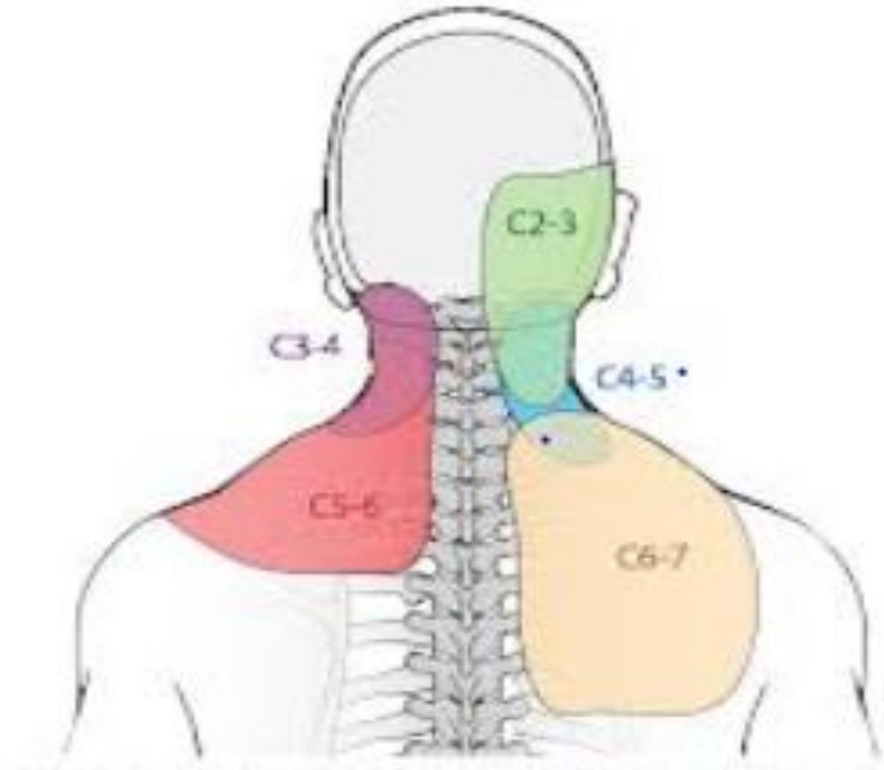
Fig. 1. Thoracic facet joint referral pain patterns.

A. Reproduced from Dreyfuss et al.⁴ Thoracic zygapophyseal joint pain patterns: a study in normal volunteers. *Spine* 1994; 19:807-811.

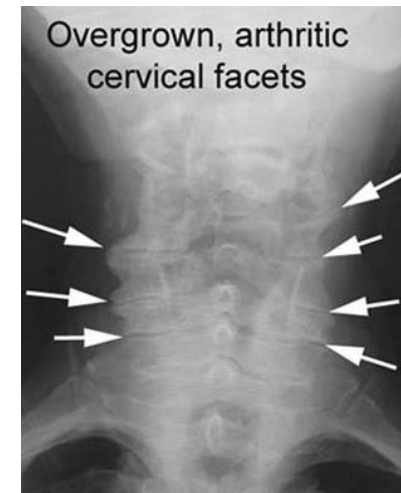
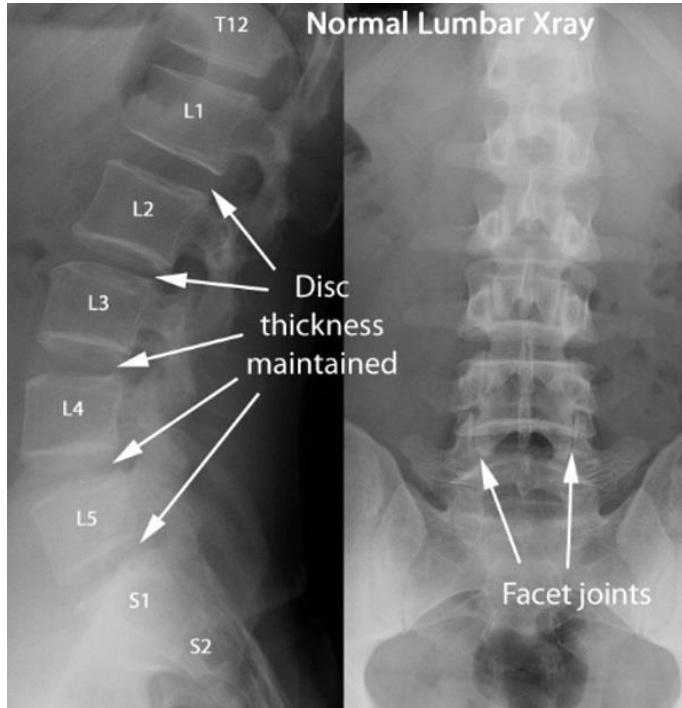
B. Reproduced from Fukui et al.⁵ Patterns of pain induced by distending the thoracic zygapophyseal joints. *Reg Anesth* 1997; 22:332-336.

Cervical facet joint pain level prevalence

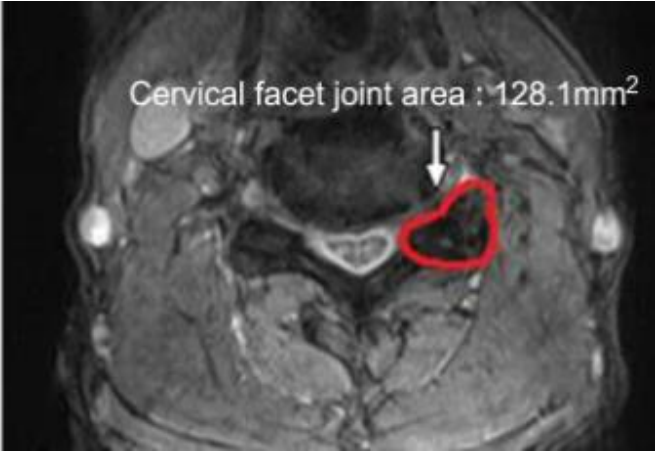
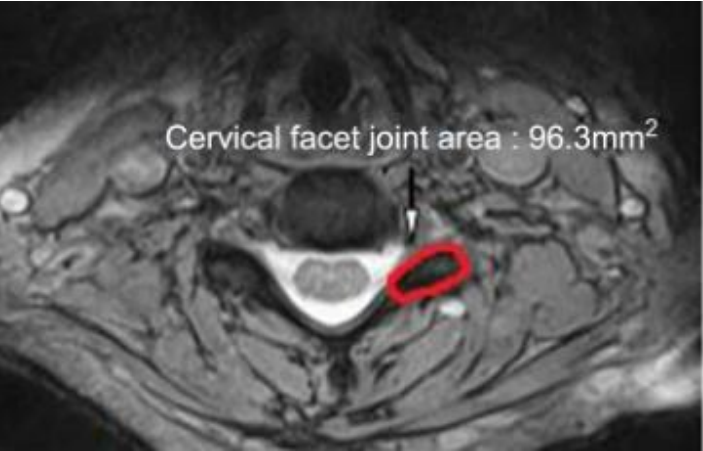
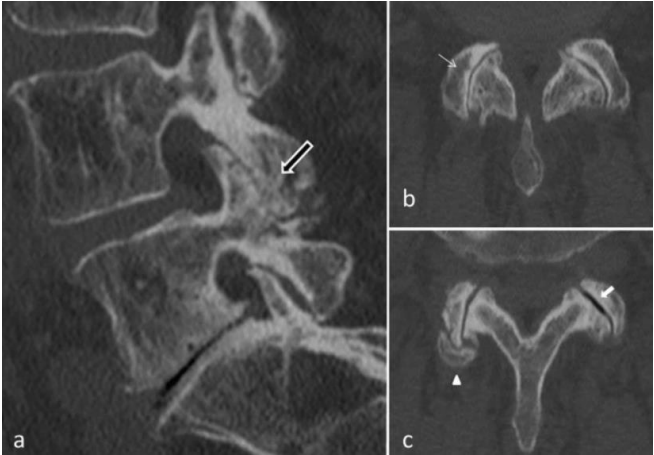
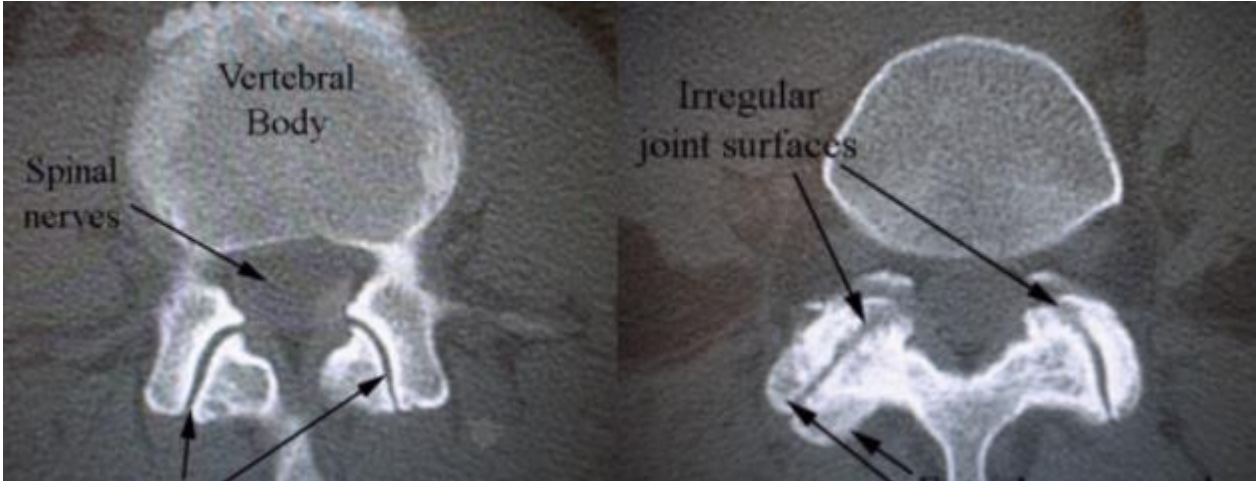
- MC: C2-3
- 2nd MC: C5-6
- 3rd MC: C6-7



XR Facet Osteoarthritis

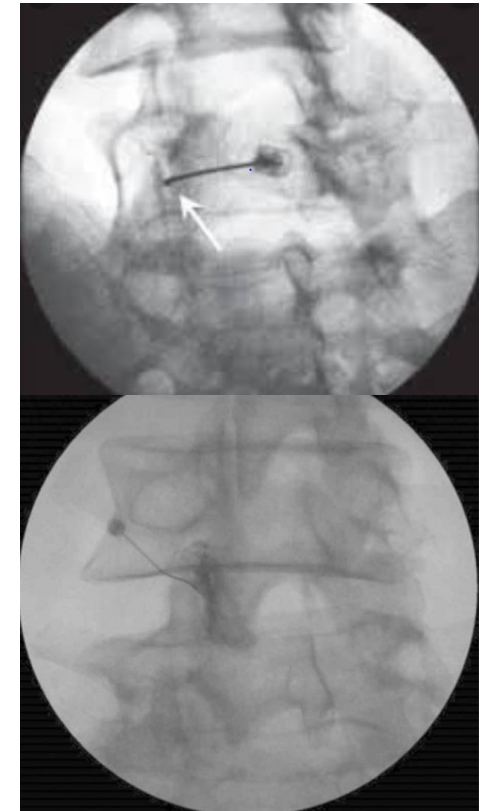
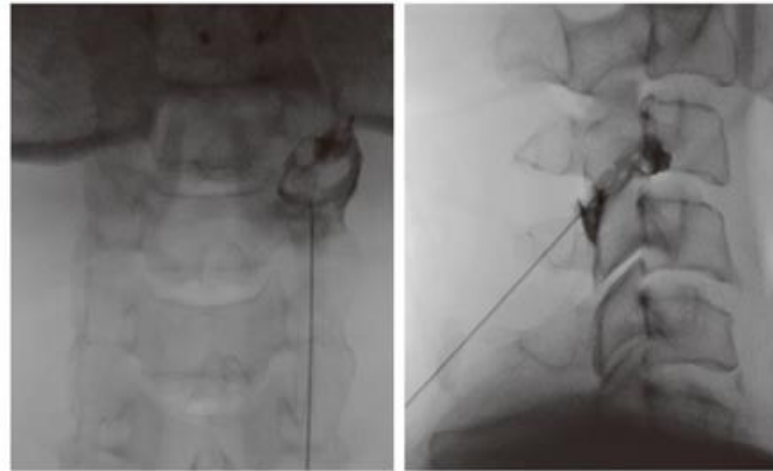
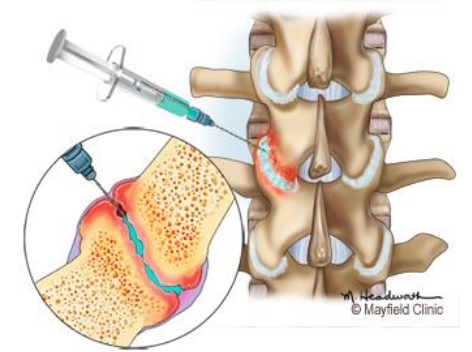
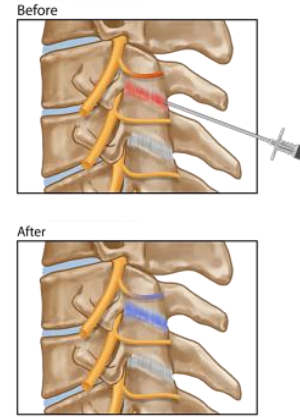
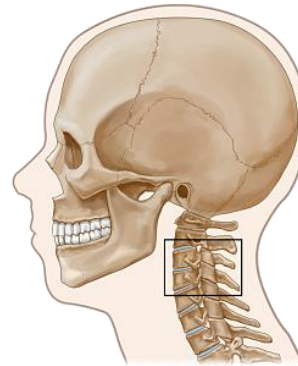


CT/MRI Facet OA



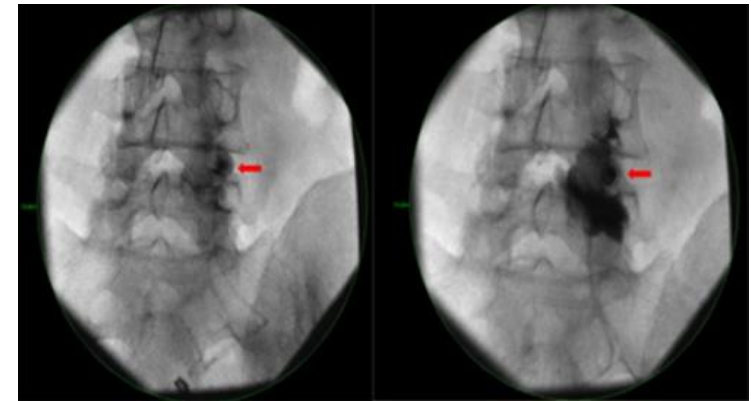
Treatment: Facet Injection

- Needle advanced into Facet joint under fluoroscopic (x-ray) guidance
- Iodinated Contrast confirms placement within joint
- ~1ml mix of lidocaine and steroid injected



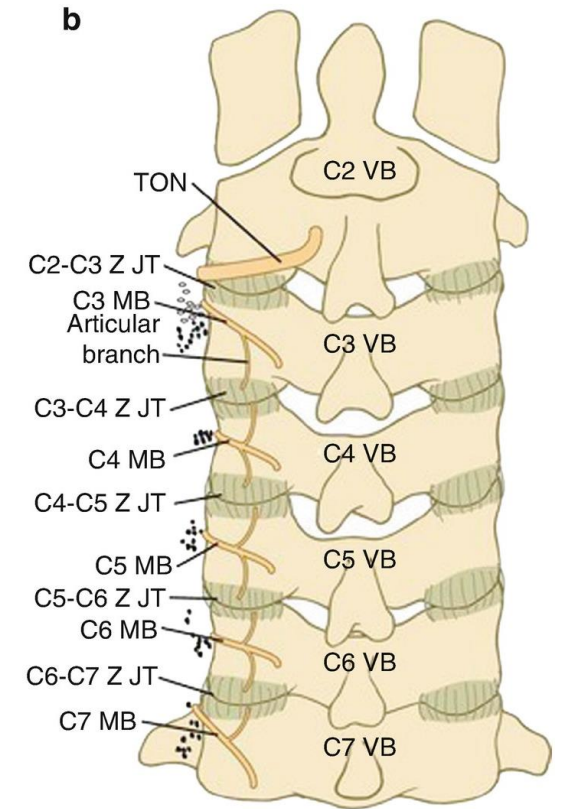
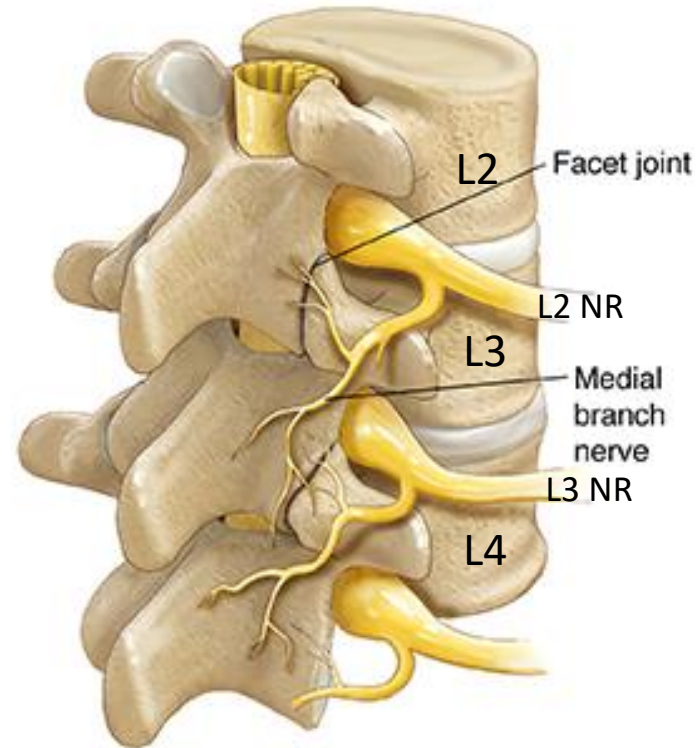
Facet Injection benefits

- Diagnostic Value
 - Weak compared to Medial Branch Block (MBB)
 - Epidural flow not uncommon (capsule)
- Warranted
 - Facet cyst nerve encroachment (strong evidence)
 - Facet pain (weak evidence)
- Therapeutic
 - Facet cyst related radicular pain
 - 75% attain >50% pain relief and avoid surgery
 - Research inconsistent secondary to difficulty making clinical diagnoses
- Duration of relief
 - Anecdotally similar to IA hip/knee/shoulder
 - ~30% cysts recur



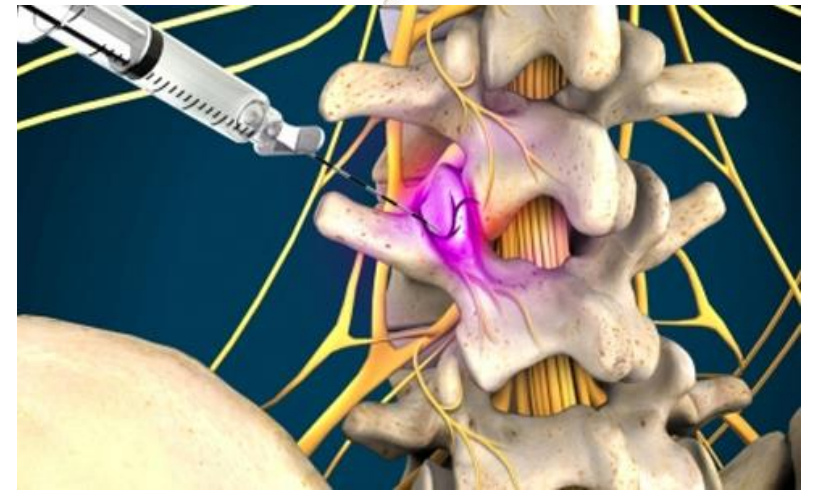
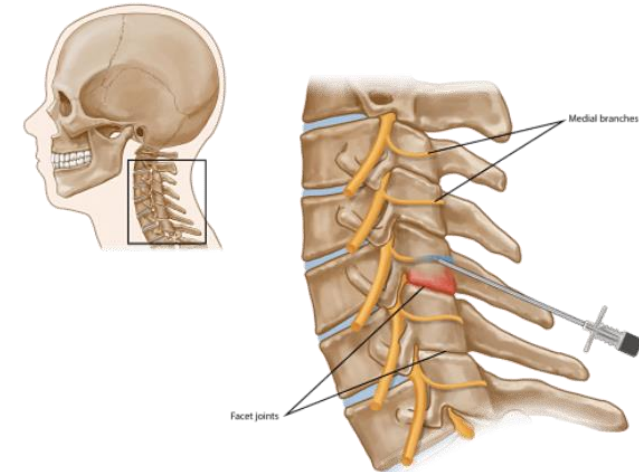
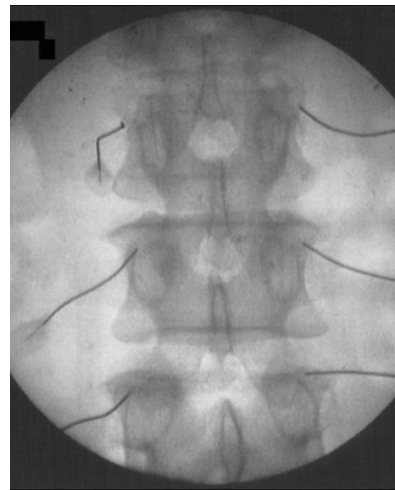
Medial Branch Nerves

- Transmit painful stimuli from the facet joints to the brain
- Each facet joint innervated by two medial branch nerves
 - Lumbar
 - Branch from superior Spinal nerve root
 - Branch from same level Spinal nerve root
 - Cervical
 - Same level NR and Medial branch



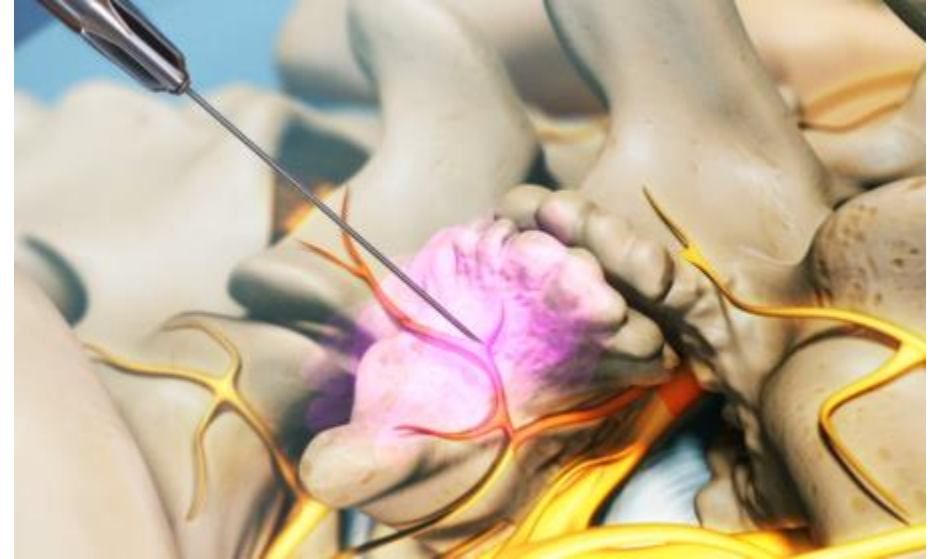
Medial Branch Block Injection

- Needles advanced to the two medial branch nerves supplying the facet joint under fluoroscopic guidance
- 0.5ml Lidocaine or bupivacaine injected
- Patient keeps pain diary for two days following injection



Benefits of Medial Branch Block(MBB) Injection

- Best diagnostic indicator
- No long term therapeutic value
- Two MBB separated by 1-2wk
 - Lidocaine 0-2h
 - Bupivacaine 20min - 6h
- Concordant pain relief (~80%) with comparative blocks allows diagnoses of facet as source of pain and predicts RFA success ~70% of patients
- Allow progression to Radiofrequency Ablation(RFA)

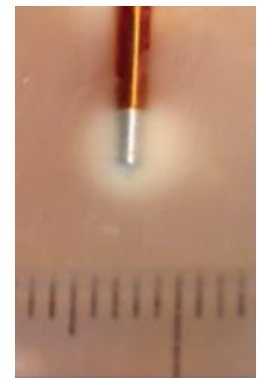
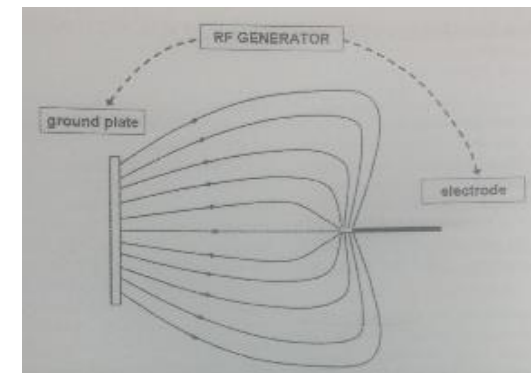
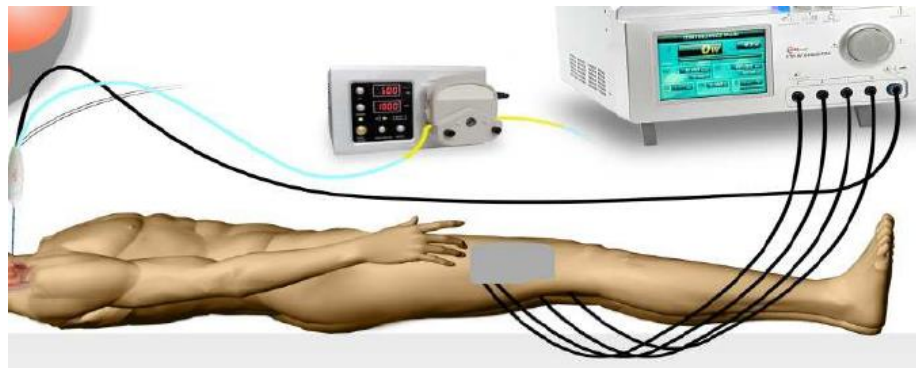


What is Radiofrequency ablation(RFA)

- Monopolar RFA
 - Equipment
 - Generator (current frequency 100-500kHz)
 - Ground plate ↔ current ↔ Needle electrode
 - Alternating current causes (charged molecules) proteins to oscillate → Friction/heat → coagulation @ 65deg C → Football lesion

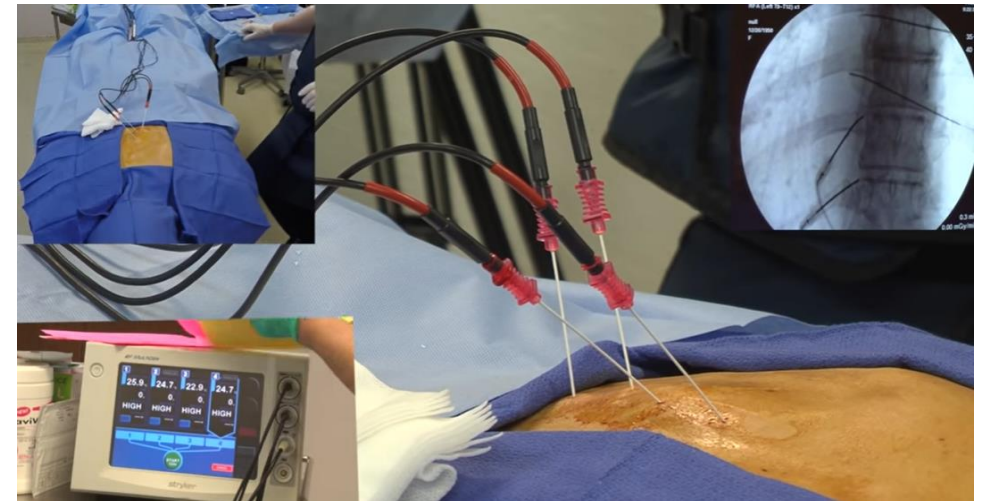


*Increased lesion size with higher temp 90deg and larger gauge needle and tip exposure



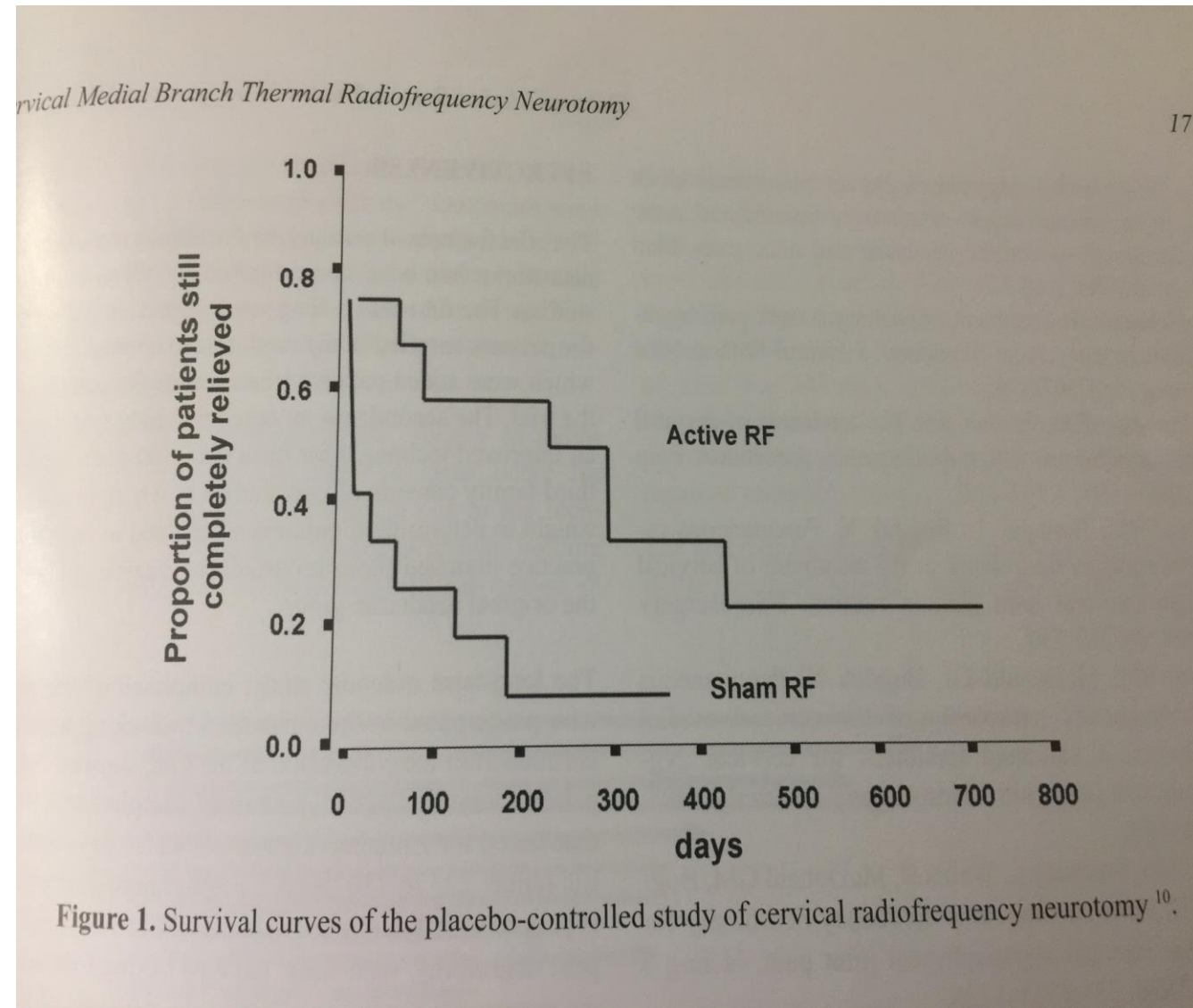
What is Radiofrequency ablation(RFA)

- Pathophysiology
 - Common Misconception- “Nerve is severed”
 - Nerve proteins coagulated in situ with out breaching nerve sheath
 - 1mm/day nerve growth generalization: not applicable
 - Endocellular clearing of coagulated proteins w/in axons required prior to nerve regeneration
 - Greater time required for nerve regrowth vs transection.
 - Mine shaft vs water pipe analogy
- Duration of relief
 - Varies: Avg. 6mon-1 year+
 - Greater length of coagulated segment
→greater duration of relief
 - Pain may or may not return with variable intensity



Cervical RFA Efficacy

- Lord, Barnsley et al. 1996 NEJM
 - 24 pts
 - Triple comparative block: Complete relief from dual comparative blocks and no relief from normal saline
 - 12pts RFA
 - Avg relief (>50%) 263days
 - 12pts RFA Sham, No current applied
 - Avg relief 8days
 - Excluded Placebo effect with 100% power
 - Not possible in clinical setting
- Published audit of author, Lord's own practice with dual comparative blocks
 - Avg %80 success rate
 - Avg relief duration 9 months



Lumbar RFA Efficacy

- 2012 MacVicar et al. “Lumbar medial branch radiofrequency neurotomy in new Zealand”
 - 109 pts w/80% relief from **2 comparative MBBs**(SIS MBB guidelines)
 - **6mon FU: 56% complete pain relief, Full restoration of function, No other Tx needed**

- 2007 Gofeld et al. “Radiofrequency denervation of the lumbar z-joints: 10 year prospective audit” (SIS p522-6) w
 - 209pts w/70% relief from **1 MBB & 1 IA** facet injection
 - **6mon FU: 1/3 pts 50% relief, 1/4 pts 80% relief**

Repeat Lumbar RFA efficacy

- PubMed Lit review 2004 Schofferman, Jerome & Kine, Garrett. (2004). Effectiveness of Repeated Radiofrequency Neurotomy for Lumbar Facet Pain. Spine. 29. 2471-3. 10.1097/01.brs.0000143170.47
 - 2nd RFA, 85% success
 - mean duration relief \geq 11.6 months
 - 3rd RFA, 94% success
 - mean duration relief \geq 11.2 months
 - 4th RFA, 88%
 - mean duration relief \geq 9 months
 - Conclusion
 - Repeat RFA is effective long-term palliative Tx for lumbar facet pain.
 - Repeat RFA had mean duration of relief of **10.5 months** and was successful $>$ 85% of the time

Considerations prior to ordering FJI, MBB, RFA, CT/MRI

- CT or MRI required for performing physican to review prior to procedure
- Cervical
 - 2 joints Bilateral or 3 joints unilateral (proprioception, vertigo)
- Lumbar
 - 3 joints unilateral or bilateral (insurance)
- Document to avoid ins. denial
 - “Greater than 6 weeks ADL hindering pain despite PT + medications for 6wks w/in last 3-6months”
 - OR
 - “Sxs worsened by PT”
 - “Worsening neurological sxs, unsafe to proceed with PT w/o advanced imaging”
 - “Sxs prevent patient from benefiting from PT”
 - “MRI or Interventional procedure with goal of pain relief allowing pt to benefit from PT”
- If successful repeat procedure may be performed every 6mon with out prior diagnostic blocks
 - Document greater than 50% relief

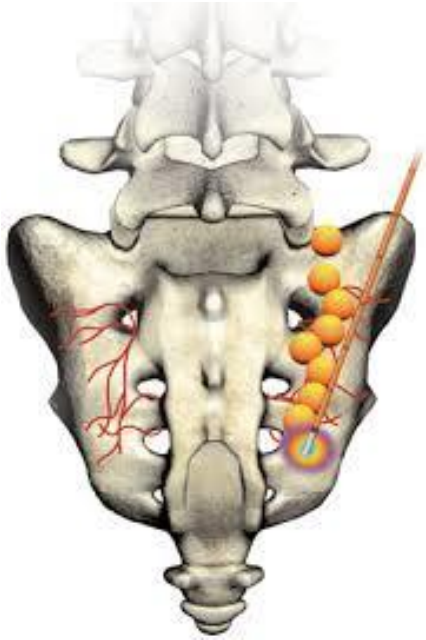
Headbanging musician

- “My arm pain and numbness is better following ESI, but my neck still hurts especially when I look side to side and up and I hear a cracking sound”
- Bilateral C6-7 Facet arthritis, Right side base of neck and shoulder pain
- Offered ACDF and disc replacement, but electively choosing to avoid/delay surgery
- C5-6 ESI : 6months out with maintained radicular pain and paresthesia resolution
 - Unfortunately right axial neck pain never fully resolved
- 1st MBB Lidocaine 90% → 2nd MBB Bupivacaine 80% → RFA Right C6-7
 - 8months out with 75% relief of pain maintained
- He promised no more headbanging

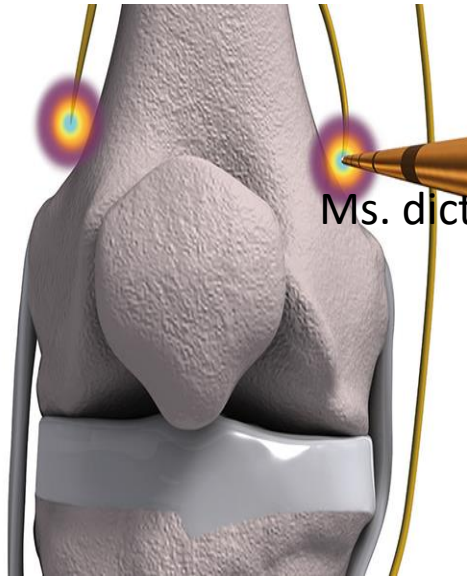


Additional areas where RFA is Utilized

- SI joint

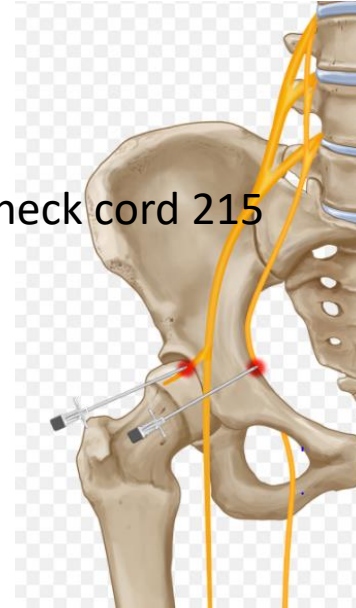


- Knee: geniculate Nerves

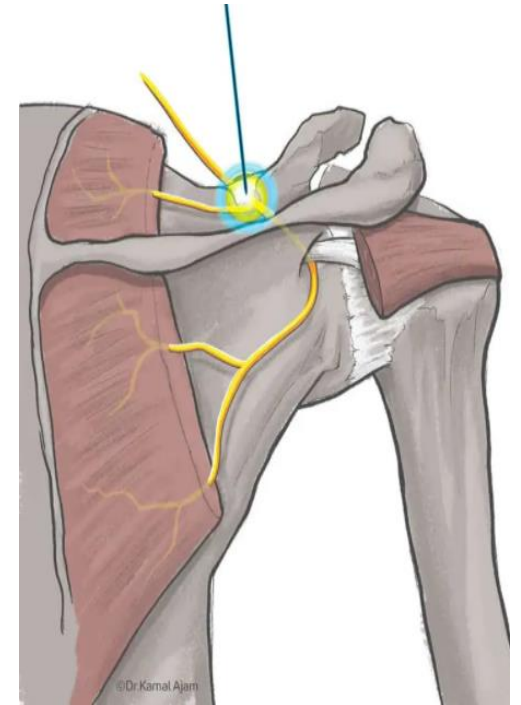


Ms. dictation for neck cord 215

- Hip: Obturator nerve

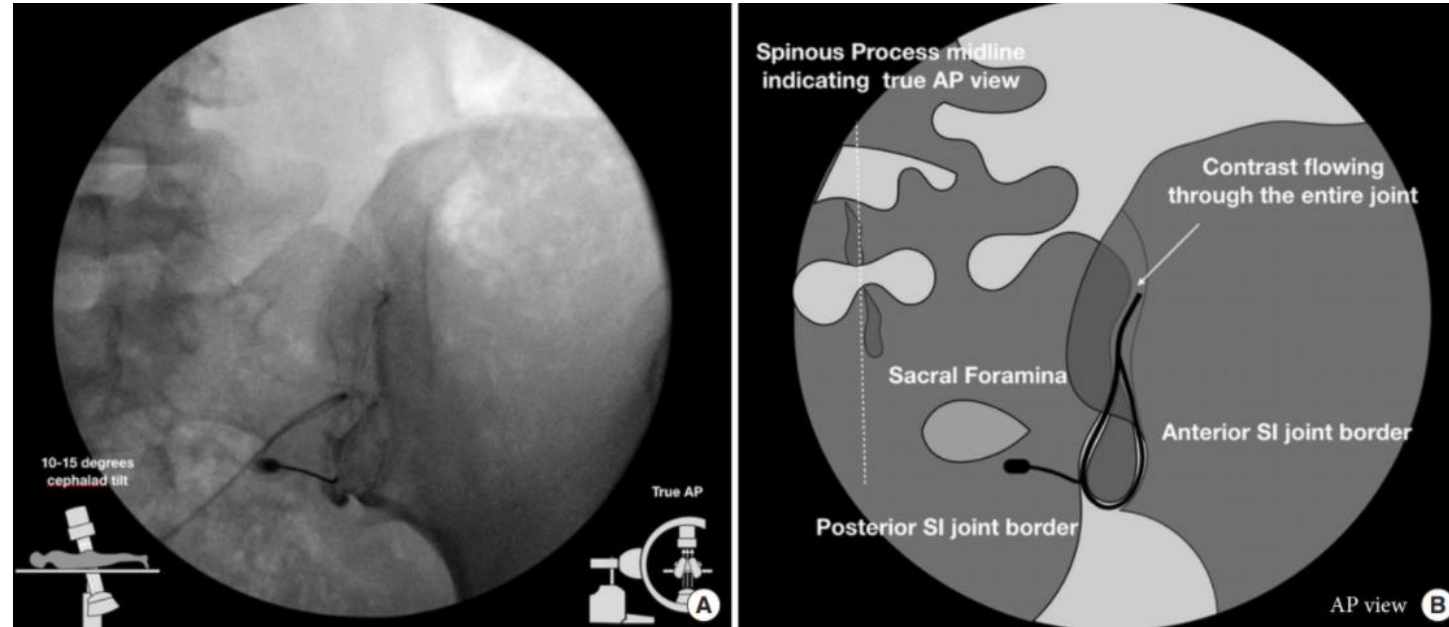


- Shoulder: Suprascapular nerve



Sacroiliac Joint Pain/injection

- Increased risk
 - Prior lumbar fusion
 - Recent Pregnancy/Vaginal delivery
 - 100% in Ankylosing Spondy, Reiter's syn
- Clinical Dx:
 - Advanced imaging unnecessary
 - >3 positive tests (FABER, Gaenslens, Fortin, Compression,distracted, Anterior sacral thrust)
- Injection guidance
 - Blind ~20% intraarticular
 - US ~30% intraarticular
 - Fluoro 85-90%
- ~70% achieve >50% relief for 2mon-1year
 - Excluding pts with spondyloarthropathy



RFA Patient Education and Preparation

- <0.5% report few seconds of pain worse than what they already experience from existing pathology
 - “Lidocaine sting worse part”
- Local anesthetic +/- PO Triazolam/Valium
 - IV sedation (\$\$, increased Risk)
- Discourage NPO
- Anticoagulants do NOT need to be held
- Sterile precautions
- MBB/FJI Procedure/table time 5-10minutes
- RFA table time < /= 30min
- RFA if successful may be repeated every 6months w/o repeating diagnostic blocks



Procedure room at the Bone and Joint Institute of Tennessee Franklin, TN

QUESTIONS?

